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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/652,579

08/31/2000

Vishnu K. Agarwal

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06/04/2004

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EXAMINER

EVERHART, CARIDAD

ART UNIT

PAPER NUMBER

2825

DATE MAILED: 06/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/652,579

**Applicant(s)**AGARWAL, VISHNU K. *AK***Examiner**

Caridad M. Everhart

**Art Unit**

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 3/19/2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 80-84 and 88-110 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 80-84 and 88-110 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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Applicant's arguments with respect to <sup>the</sup> claims have been considered but are moot in view of the new ground(s) of rejection.

Applicant has amended to include the limitations "diborane and HCl", and applicant's arguments have centered upon the amendment, apart from applicant's opening general comments on applicant's invention. Applicant's comments have been helpful in reviewing the various embodiments disclosed in applicant's specification. Applicant has pointed out that the purpose of applicant's invention is to reduce the association of oxygen with the conductive layer during formation of other layer or layers. However, this aspect of applicant's invention is respectfully considered to not be persuasive because the claims recite "A method of treating a wafer", and do not recite the reduction of association of oxygen.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 103***

Claims 80,81,88,89,96-101, and 105-110 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sekine, et al. (US 5,622,888) in view of Kim, et al. (US 6,194,263B1) further in view of Moslehi (US 5,089,441) of in view of Yew, et al. (US 5,753,559) .

Sekine discloses the steps of depositing a first conductive layer (col. 5, lines 10-14), exposing the wafer in situ to a reducing environment (col. 5, lines 36-44), depositing a second conductive layer (col. 5, lines 35-45). Because of the "comprising" language and the fact that the claim is silent with respect to the order or spatial relationship of the films,

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there is nor order recited or implied in the claims with respect to the first or second conductive films. Therefore, the tungsten film being the one treated in situ with the reducing gas of silane reads on the claims whether the first or second conductive film is recited.

Sekine is silent with respect to exposing one of the layers to diborane, although Sekine does disclose that the first conductive layer is doped polysilicon(col. 5, lines 65-67) and Sekine further discloses HSG(col. 1, lines 53-57).

Kim discloses the treating of HSG with HF which results in hydrogenation of the surface and protection from further oxidation as well as removal of oxide (col. 7, lines 60-67).

Moslehi is relied upon for the equivalence of HF and HCl for this purpose(col. 12, lines 35-48).

It would have been obvious to one of ordinary skill in the art to have treated the polysilicon HSG surface taught by Sekine according to the method of Kim in view of Moslehi in order to gain the benefit to the HSG surface taught by Kim.

Yew teaches HF cleaning (col. 6, lines 45-55) and Yew teaches that HSG-Si may be doped with either phosphine or diborane(col. 8, lines 20-44).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have doped the HSG taught by Sekine with diborane because Yew teaches that HSG-Si may be doped with either phosphine or diborane and because Sekine teaches that the lower electrode may be formed of doped polysilicon and because Sekine further discloses HSG which increases the area of the lower electrode.

Claims 83,91,94, and 103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sekine in view of Kim further in view of Moslehi as applied to claim 80 or in view of Sekine in view of Yew as applied to claim 80 above, and further in view of Chen et al (US 6,077,742).

The reasons are as given in paper No. <sup>25</sup> and as argued above.

Claims 82,84,90, 92, 95, 102, and 104 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sekine in view of Kim further in view of Moslehi or Sekine in view of Yew as applied to claim 80 above, and further in view of Lee, et al (US 2001/0001501A1).

The reasons are as given in paper No. <sup>25</sup> and as argued above.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Everhart  
5-28-2004

  
CARIDAD EVERHART  
PRIMARY EXAMINER